J.R. Simplot Company
P.O. Box 912,
Pocatello, Idaho 83204

208 235-5600 Business

December 7, 2020

Arthur Burbank
USDA Forest Service
4350 South Cliffs Dr.
Pocatello, ID 83204

Subject: Biological Selenium Removal Treatment Technology
Water Treatment Pilot Study
October 2020 Progress Report

Dear Art,

This progress report summarizes key activities in October 2020 associated with Phase 2 of the Water Treatment Pilot Study located near Hoopes Spring. This Pilot Study is being conducted as part of the Smoky Canyon Mine Remedial Investigation/Feasibility Study (RI/FS) to provide information on the effectiveness of the active biological treatment system in removing selenium and other COPCs from South Fork Sage Creek Springs and Hoopes Spring.

Work related to the approved Phase 2 Pilot Study continues at the site in accordance with the Final *Phase 2 Pilot Study Work Plan and Sampling and Analysis Plan, Ultra-Filtration/Reverse Osmosis and Biological Selenium Removal Fluidized Bed Bioreactor Treatment Technology* (Phase 2 WP/SAP).

Identification of Deliverables and Data Transmittals

There were no outstanding deliverables or transmittals for the month of October. At the time of this report, we have received laboratory data for Week 139 and Week 141. Preliminary laboratory data are presented in Table 1. The field data for the Week 139, and 141 sampling events is summarized in Table 2.

Completed Activities

The following activities associated with the Phase 2 Pilot Study were completed in October 2020:

- Continued system operation and treatment of selenium.

The Treatment System Pilot (TSP) influent total selenium concentration for Week 139 was 166 ug/L and 168 ug/L for Week 141. The Treatment System Pilot effluent total selenium concentration for Week 139 was 71 ug/L and 11.1 ug/L for Week 141. The Week 139 sample was impacted by an extended power outage that interrupted the treatment and operation of the iron co precipitation process resulting in a higher than normal concentration of selenium in the Effluent sample. Unfortunately, the power outage occurred prior to the sample being taken and did not allow enough time for the process to completely stabilize. The average removal efficiency for October was approximately 88.7% for total selenium removal.

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The average flow of the TSP for the month of October was 1,760 gpm. Since full scale operations began in early December 2017 approximately 2.317 billion gallons of impacted water has been treated. The mass of selenium removed from December 2017 through October 2020 is approximately 2,524 pounds.

Upcoming Activities

The following activities associated with the Phase 2 Pilot Study are planned through November 2020:

- Continue system monitoring in accordance with the sampling and analysis plan.
- The iron coprecipitation pilot is running well and preliminary indication are showing improved selenium removal.

Please contact me if there are questions regarding this monthly progress report.

Sincerely,

Jeffrey Hamilton
Environmental Engineer

cc:

Arthur Burbank – USFS, 410 East Hooper, Soda Springs, ID 83276
Sherri Stumbo – USFS, 4350 South Cliffs Dr., Pocatello, ID 83204
Rick McCormick – Jacobs, email only
Doug Scott – Jacobs, email only
Ralph Oborn – IDEQ, email only
Brady Johnson – IDEQ, email only
Tracy Rita – IDEQ, email only
Colleen O'Hara – BLM, email only
Jennifer Crawford – USEPA, email only
Sandi Fisher – USFWS, email only
Ryan Braham – USFWS, 4425 Burley Dr., Suite A, Chubbuck, ID 83202
Kelly Wright –Shoshone-Bannock Tribes, P.O. Box 306, Fort Hall, ID 83203
Susan Hanson – (b) (6) , Pocatello, ID 83202
Gary Billman – IDL, email only
Alan Prouty – J.R. Simplot Company, email only
Rachel Roskelley – J.R. Simplot Company, email only
Lori Lusty – J.R. Simplot Company, email only
Jon Witt – J.R. Simplot Company, email only
Dedra Williams – J.R. Simplot Company, email only
Chad Gentry – J.R. Simplot Company, email only
Ron Quinn – J.R. Simplot Company, email only
Delmer Cunningham – J.R. Simplot Company, email only
Andy Koulermos – Formation Environmental, email only
Lily Vagelatos – Formation Environmental, email only
Jeremy Aulbach – Brown and Caldwell, email only

Table 1
Laboratory Results Full Analyte List

Hoopes Springs Water Treatment Plant Pilot Study
Phase 2, Performance Monitoring

		Week 139		
Station >>		Influent	Ultra Filtration Backwash	Effluent
Sample ID >>		SC1020-LSSHS-IN001	SC1020-LSSHS-UFB001	SC1020-LSSHS-EF001
Date >>		10/14/2020		
Analyte	**Units**			
General Chemistry				
Alkalinity, Total as CaCO3	mg/L	180	40	250
Bicarbonate, as CaCO3	mg/L	1 U	1 U	1 U
Ammonia, as N	mg/L	0.026 U	0.0076 U	0.026 U
Biochemical Oxygen Demand	mg/L	2 U	2 U	2 U
Carbonate, as CaCO3	mg/L	180	40	250
Hardness, as CaCO3	mg/L	266	56.6	438
Chemical Oxygen Demand	mg/L	20	18	21
TDS	mg/L	284	300	476
TOC	mg/L	0.892 J	1.14	1.06
TSS	mg/L	2 U	2 U	2 U
Cations and Anions				
Chloride	mg/L	13.6	2.81	31.5
Fluoride	mg/L	0.242	0.0847 J	0.515
Calcium, Dissolved	mg/L	66.6	14.2	107
Magnesium, Dissolved	mg/L	24.4	5.13	41.3
Potassium, Dissolved	mg/L	0.786	0.301 J	1.45
Sodium, Dissolved	mg/L	7.67	2.54	12.3
Metals and Metalloids				
Aluminum, Dissolved	mg/L	0.0076 U	0.0407 J	0.0076 U
Aluminum, Total	mg/L	0.0076 U	0.026 U	0.0076 U
Antimony, Dissolved	mg/L	0.0000862 J	0.0000732 U	0.000125 J
Antimony, Total	mg/L	0.0000806 J	0.000191 J	0.000191 J
Arsenic, Dissolved	mg/L	0.000398 U	0.000398 U	0.000398 U
Arsenic, Total	mg/L	0.000398 U	0.000398 U	0.000398 U
Barium, Dissolved	mg/L	0.0521	0.0109	0.041
Barium, Total	mg/L	0.0501	0.0179	0.0505
Beryllium, Dissolved	mg/L	0.000047 U	0.000047 U	0.000047 U
Beryllium, Total	mg/L	0.000047 U	0.000047 U	0.000047 U
Boron, Dissolved	mg/L	0.000238 U	0.000238 U	0.000238 U
Boron, Total	mg/L	0.000238 U	0.0108 J	0.0166 J
Cadmium, Dissolved	mg/L	0.0000362 U	0.0000362 U	0.0000362 U
Cadmium, Total	mg/L	0.0000362 U	0.0000362 U	0.0000362 U
Chromium, Dissolved	mg/L	0.00052 J	0.000112 J	0.000116 J
Chromium, Total	mg/L	0.000575 J	0.000984 J	0.000775 J
Cobalt, Dissolved	mg/L	0.000285 J	0.000262 J	0.00261
Cobalt, Total	mg/L	0.000301 J	0.0000507 J	0.00277
Copper, Dissolved	mg/L	0.0000496 J	0.000114 J	0.000114 J
Copper, Total	mg/L	0.000124 J	0.000326 J	0.000491 J
Iron, Dissolved	mg/L	0.0015 U	0.0036 J	0.0127 J
Iron, Total	mg/L	0.0986	0.0806	0.586
Lead, Dissolved	mg/L	0.0000554 U	0.0000554 U	0.0000554 U
Lead, Total	mg/L	0.0000554 U	0.0000554 U	0.0000554 U
Manganese, Dissolved	mg/L	0.000908 J	0.000573 J	0.011
Manganese, Total	mg/L	0.000844 J	0.00192	0.0137
Mercury, Dissolved	mg/L	0.000034 J	0.000025 J	0.000019 J
Mercury, Total	mg/L	0.000023 J	0.000019 J	0.000014 J
Molybdenum, Dissolved	mg/L	0.00206	0.000384 J	0.0169
Molybdenum, Total	mg/L	0.00213	0.000422 J	0.0168
Nickel, Dissolved	mg/L	0.000496 J	0.000122 J	0.00795
Nickel, Total	mg/L	0.000311 J	0.000223 J	0.00843
Selenium, +4 (selenite)	mg/L	0.00015 U	0.00015 U	0.0222
Selenium, +6 (selenate)	mg/L	0.143	0.0304	0.0484
Selenium, Dissolved	mg/L	0.177	0.0321	0.0787
Selenium, Total	mg/L	0.166	0.0308	0.0711
Silver, Dissolved	mg/L	0.0000172 U	0.0000172 U	0.0000172 U
Silver, Total	mg/L	0.0000172 U	0.0000172 U	0.0000214 J

Table 1
Laboratory Results Full Analyte List

Hoopes Springs Water Treatment Plant Pilot Study
Phase 2, Performance Monitoring

		Week 139		
	Station >>	Influent	Ultra Filtration Backwash	Effluent
	Sample ID >>	SC1020-LSSHS-IN001	SC1020-LSSHS-UFB001	SC1020-LSSHS-EF001
	Date >>	10/14/2020		
Analyte	**Units**			
Thallium, Dissolved	mg/L	0.0000657 U	0.0000657 U	0.0000657 U
Thallium, Total	mg/L	0.0000657 U	0.0000657 U	0.0000657 U
Uranium, Dissolved	mg/L	0.00155	0.000214 J	0.00261
Uranium, Total	mg/L	0.00152	0.00029 J	0.00297
Vanadium, Dissolved	mg/L	0.00102 J	0.000178 J	0.00014 U
Vanadium, Total	mg/L	0.00105 J	0.00138 J	0.000897 J
Zinc, Dissolved	mg/L	0.00367 J	0.00108 J	0.000653 J
Zinc, Total	mg/L	0.00348 J	0.00142 J	0.000725 J
Nutrients				
Nitrate + Nitrite, as N	mg/L	0.405	0.149	0.72
Nitrate, as N	mg/L	0.4	0.15	0.72
Phosphorus, Total	mg/L	0.0329	0.0378	0.0834
Sulfate	mg/L	65.9	14.1	136
Sulfide	mg/L	1 U	1 U	1 U

Notes:
Results presented are preliminary, and have not been validated at the time of this report.
U - Analyte not detected above the method detection limit (MDL).
J - Result is estimated.

Table 2
Laboratory Results Focused Analyte List

Hoopes Springs Water Treatment Plant Pilot Study
Phase 2, Performance Monitoring

		Week 141		
Station >>		Influent	Ultra Filtration Backwash	Effluent
Sample ID >>		SC1020-LSSHS-IN002	SC1020-LSSHS-UFB002	SC1020-LSSHS-EF002
Date >>		10/28/2020		
Analyte	**Units**			
General Chemistry				
Ammonia, as N	mg/L	0.026 U	0.026 U	0.026 U
Biochemical Oxygen Demand	mg/L	2 U	2 U	2 U
TSS	mg/L	2 U	2 U	2 U
Nutrients				
Nitrate, as N	mg/L	0.42	0.21	0.36
Sulfide	mg/L	1 U	1 U	1 U
Phosphorus, Total	mg/L	0.0314	0.0341	0.0327
Metals and Metalloids				
Selenium, Dissolved	mg/L	0.172	0.035	0.0119
Selenium, Total	mg/L	0.168	0.0357	0.0111

Notes:

Results presented are preliminary, and have not been validated at the time of this report.

U - Analyte not detected above the method detection limit (MDL).

J - Result is estimated.

Table 3
Field Water Quality Data

Hoopes Springs Water Treatment Plant Pilot Study
Phase 2, Performance Monitoring

		Parameter >>	Dissolved Oxygen	ORP	pH	SC	Temperature	Turbidity
		Units >>	mg/L	mV	SU	umhos/cm	C	NTU
Station	**Sample ID**	**Date**						
Week 139								
Influent	SC1020-LSSHS-IN001	10/14/2020	10.72	133	7.26	494	12.97	0
Ultra Filtration Backwash	SC1020-LSSHS-UFB001	10/14/2020	11.11	145	6.65	135	14.1	1.6
Effluent	SC1020-LSSHS-EF001	10/14/2020	10.51	165	6.26	356	13.07	1
Week 141								
Influent	SC1020-LSSHS-IN002	10/28/2020	9.07	109	7.44	477	15.78	0
Ultra Filtration Backwash	SC1020-LSSHS-UFB002	10/28/2020	10.93	91	7.24	152	14.12	1.9
Effluent	SC1020-LSSHS-EF002	10/28/2020	11.68	108	6.93	501	13.13	0

Notes: